STUDY OF MIXED OXIEDNANOPARTICLES FOR GASSENSING APPLICATION

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SYNOPSIS

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Study of mixed oxide nanoparticles for gas sensing application

The increasing pollution in the atmosphere demands the necessity of more sensitive gas sensing materials to detect the type and concentration of the gas. The growing industrialization, increasing automobile vehicles. Use of insecticides and pesticides are among the gases like CO, CO_2, H_2S, etc. [1]. So the continuous effects have been made for the development of the gas sensors those can detect the gases hazardous to human health. Gas sensor receive chemical or physical stimulus with an exposure to the gas and convert in to the proportional electrical or optical signal. The different type of the gas sensor used commercially includes semiconductor gas sensor, catalytic gas sensor, electrochemical gas sensor, optical gas sensor and acoustic gas sensor [2, 3]. The properties useful for the selection of a gas sensor in particular application includes sensitivity, selectivity, detection limit, response time. The recent work on gas sensor is dedicated to the development of gas sensor that have low cost with improve sensitivity and reliability with low response time.

Over the past few decades, various type of gas sensor have been developed based on different sensing materials and methods. Accordingly, the gas sensor are classified as catalytic combustion, electrochemical, thermal conductive, infrared absorption, paramagnetic, solid electrolyte and metal oxide semiconductor sensor [4]. Broadly, the gas sensor classified based on their sensing methods and divided them to two groups: (a) methods based on variation in electrical properties and (b) methods based on variation in other properties. Among the above sensor metal oxide semiconductor attracts the attention for developing sensor at low temperature.

The metal oxide are the suitable materials for gas sensing due to changes in their conductivity by absorption of a gas. The metal oxide materials works on the chemiresistive principal. The change in resistance of metal thin film by exposure of the gas. The gas molecules interaction with the metal oxides by accepting or donating the change carriers which result into change of the resistance of metal oxide. The change in the resistance demands upon the majority carriers in the metal oxide and the nature of interacting gas molecules. For n-type materials, oxidizing gases increases the resistance of the material while reducing gases decrease the resistance [5]. For p-type materials oxidizing gases decrease the resistance of the material while reducing gases increase the resistance [6].

The vast review of the literature suggests that fabrication of the Nano crystalline oxide gas sensor with quick response and better recovery time is demanded as the future sensor for monitoring gases in the atmosphere. Thus it is decided to synthesis and study the properties of the Nano crystalline oxide gas sensor. The suitable chemical route will be used for the synthesis of the nanoparticles of the metal oxides. The crystallographic study of the materials will be performed by X-ray diffraction. The morphological stud of the materials will be performed by scanning electron microscopy and transmission electron microscopy. The elemental analysis will

be carried out by using electron diffraction spectroscopy. The chemical structural analysis will be performed by using Fourier transformer infrared spectroscopy. The ultraviolet spectroscopy study will be performed to detect energy bands and band gap energy. The gas sensing properties sensitivity, selectivity, response time and reproducibility of the materials will be studied by using gas sensing instrument setup**.**

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